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1 (Canceled)

2 A dynamically reconfigurable VLSI device for implementing in hardware any multiple outputs combinational target circuit having the output functions expressed in logical sum-of-product equations with a maximum of m inputs, a maximum of r outputs and a maximum of n product terms $p(k)$, comprising:

a register with m bits for storing the input variables;

n cells, a cell $C(k)$ for determining the logical value of a product term $p(k)$ of said equations for given inputs;

a block of r OR gates, each one with n inputs, associated with said cells $C(k)$ for receiving the logical value of product terms $p(k)$ and outputting the r bits of output functions;

wherein said cell $C(k)$ comprises:

a storage area for storing the information that characterizes a product term, named mask word, product word and function word;

first logic level means for receiving said m inputs and said mask word to produce a first intermediate result, which identify the input variables that form a product term;

second logic level means for comparing the said product term with said first intermediate result to produce a second intermediate result concerning a product term;

third logic level means for receiving said second intermediate result to produce the logical value of the product term; and

forth logic level means for transferring said function word to r outputs, according to said logical value of said product term $p(k)$, and subsequently to be OR-ed with function words of other product terms.

3 A dynamically reconfigurable VLSI device as in claim 2, wherein said storage area of a cell $C(k)$ comprises two m -bit registers and one r -bit register.

4 A dynamically reconfigurable VLSI device as in claim 2, wherein said first logic level of a cell $C(k)$ comprises $m \cdot (2\text{-bit})$ AND gates, each one for receiving a respective bit of said m input variables and of said mask word to produce said first intermediate result.

5 A dynamically reconfigurable VLSI device as in claim 2, wherein said second logic level of a cell $C(k)$ comprises $m \cdot (2\text{-bit})$ XNOR gates, each one for receiving a respective bit of said first intermediate result and of said product word to produce a bit of said second intermediate result.

6 A dynamically reconfigurable VLSI device as in claim 2, wherein said third logic level of a cell $C(k)$ comprises one m -bit AND gate to produce a logical value which is the value of the product term.

7 A dynamically reconfigurable VLSI device as in claim 2, wherein said forth logic level of a cell $C(k)$ comprises $m \cdot (2\text{-bit})$ AND gates for transferring said function word to outputs, considering the logical value of said product term $p(k)$.

8. (Currently amended) A dynamically reconfigurable VLSI device for implementing in hardware a target synchronous sequential circuit with maximum 2^s states, clock input only and outputs taken from the state register, wherein the multiple outputs combinational circuit which establish the next state defined by

sum-of-product logical equations is implemented according to claim 2, with maximum s inputs, maximum s outputs and maximum n product terms $p(k)$ and wherein the input register is a state register with s bits; and further comprising:
a feedback connection to establish the next state.

9. (Currently amended) A dynamically reconfigurable VLSI device for implementing in hardware a target synchronous sequential circuit with maximum 2^s states, m data inputs, clock input and r outputs, wherein two multiple outputs combinational circuits are implemented according to claim 2, the first combinational circuit defined by the next state sum-of-product logical equations with maximum $(m + s)$ inputs, maximum s outputs and maximum n_1 product terms $p(k)$ and the second combinational circuit defined by the output sum-of-product logical equations, with maximum s inputs, maximum r outputs, and maximum n_2 product terms $p(k)$; and further comprising:

a state register with s bits, wherein said state register is the input register of the second combinational circuit;

a feedback connection to establish the next state.

10 (Canceled)

11 (Canceled)

12 A dynamically reconfigurable VLSI device for implementing in hardware any multiple-output combinational target circuit defined by a group of logical sum-of-product equations, with maximum m inputs, maximum r outputs and a maximum of q product terms in each equation, having a register with m bits for storing the input variables and for each single sum-of-products logical equation, considered as an independent equation, further comprising:

q modified cells, a modified cell $C(k)$ for determining the logical value of a product term $p(k)$ of said independent equation, for given inputs;

a single OR gate associated with said q modified cell $C(k)$ for receiving the logical value of product terms $p(k)$ to provide a single output for said independent equation;

wherein said modified cell $C(k)$ comprises:

a storage area formed by two m -bit registers for storing the information that characterizes a product term, named mask word and product word;

first logic level that comprises $m \cdot (2\text{-bit})$ AND gates, each one for receiving a respective bit of said inputs and of said mask word to produce a respective bit of first intermediate result, which identify the input variables that form a product term;

second logic level that comprises $m \cdot (2\text{-bit})$ XNOR gates, each one for receiving a respective bit of said product word and said first intermediate result to produce a second intermediate result concerning a product term; and

third logic level that comprises one m -bit AND gate for receiving the m bits of said second intermediate result to produce a logical value which is the value of the product term.

13. (Currently amended) A dynamically reconfigurable VLSI device for implementing in hardware a target synchronous sequential circuit with maximum 2^s states, clock input only and outputs taken from the state register, wherein the multiple outputs combinational circuit which establish the next state defined by sum-of-product logical equations is implemented according to claim 12, with maximum s inputs, maximum s outputs and maximum q product terms $p(k)$ in each said equation and wherein the input register is a state register with s bits; and further comprising:

a feedback connection to establish the next state.

14. (Currently amended) A dynamically reconfigurable VLSI device for implementing in hardware a target synchronous sequential circuit with maximum 2^s states, m data inputs, clock input and r outputs, wherein two multiple outputs combinational circuits are implemented according to claim 12, the first

combinational circuit defined by the next state sum-of-product logical equations with maximum $(m + s)$ inputs, maximum s outputs and maximum q_1 product terms $p(k)$ in each said next state equation, and the second combinational circuit defined by the output sum-of-product logical equations, with maximum s inputs, maximum r outputs and maximum q_2 product terms $p(k)$ in each said output equation; and further comprising:

- a state register with s bits, wherein said state register is the input register of the second combinational circuit;

- a feedback connection to establish the next state.

15 (Currently amended) A method for implementing target circuits selected from multiple-output combinational circuits and from synchronous sequential circuits, having their behavior described by groups of logical sum-of-product equations, wherein each said group of logical sum-of-product equations is implemented in a dynamically reconfigurable VLSI device, as in claims 2 or 12, the method comprising the steps of:

- inputting a request to reconfigure said VLSI device to said target circuit;

- identifying the VLSI device to be configured, considering its internal structure, of type cell $C(k)$ or of type modified cell $C(k)$;

- generating memory words uniquely defining each product term $p(k)$ of said sum-of-products logical equations; and

- implementing the target circuit by storing said memory words into a corresponding registers of type cell $C(k)$ or of type modified cell $C(k)$.